

State of Maryland
BOARD OF NATURAL RESOURCES

Maryland Commercial Fish Hatchery Operations 1946 and 1947

COIT M. COKER



June, 1947
Educational Series No. 15

CHESAPEAKE BIOLOGICAL LABORATORY
Solomons Island, Maryland

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MARYLAND COMMERCIAL FISH HATCHERY OPERATIONS

1946-1947
COIT M. COKER

GENERAL

The propagation of yellow perch, *Perca flavescens*, and shad, *Alosa sapidissima*, during the biennium 1946-47 was continued on a scale reduced somewhat from that of previous years in accordance with findings and recommendations announced in the 1944-45 biennial hatchery report (Educational Series # 11 of the Chesapeake Biological Laboratory). To prevent inefficient and needless duplication of effort, perch hatching was confined to the box-system station at the breeding grounds of Severn Run—a stream which normally supplies a surplus of spawn beyond the requirements to maintain its own perch population. An experimental box-system shad hatchery was set up at Charlestown on the North East River at the head of Chesapeake Bay; and the jar-system hatching of shad at Fort Belvoir on the Potomac River was continued through a cooperative arrangement with the U. S. Fish and Wildlife Service. Perch fry were released in suitable streams of all the tidewater counties; shad fry were released in the waters of the Patuxent and North East rivers.

Combined hatchery operations were carried on with a staff of six men, involving the use of one truck and a motor launch plus an additional truck at the height of the fry distribution period.

YELLOW PERCH

The migration of the adult perch to the spawning grounds at the headwaters of Severn Run in 1946 was first observed near the end of February. Initial egg deposition occurred on the night of March 5, when the water temperature was recorded as 46.0° F. Deposition reached a peak between March 9 and March 13. By March 21, egg laying had practically ceased and collection of eggs was discontinued. The incubation period averaged twenty days, the total period extend-

ing from March 6 to April 2, the average of the daily water temperatures being 48.0° F. Compared with 1946, the 1947 season was retarded by about ten days and water temperatures were appreciably lower throughout the period of spawning and hatching activities. The incubation period averaged twenty-one days. Approximate comparative data for the two seasons are given in Table I.

As in previous years, quantities of eggs laid at the tidal downstream edge of the spawning grounds were adversely affected, due in some



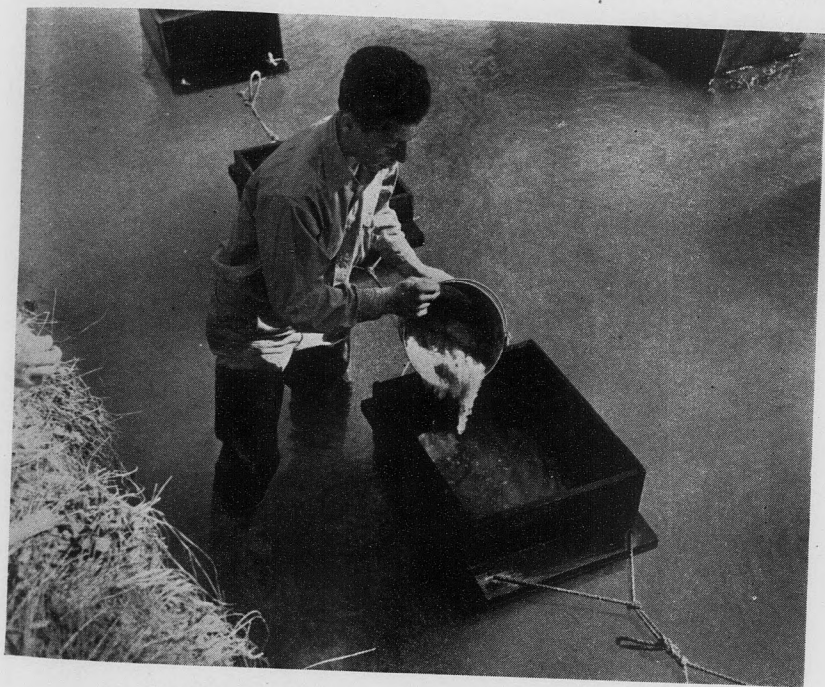
YELLOW PERCH EGGS

cases to recession of the tide and exposure of the stranded egg masses to drying and to freezing temperatures, and in other cases to undetermined physical, chemical or biological factors. Efforts were made to salvage them as rapidly as possible after deposition, but lack of viability nullified these emergency measures and they were abandoned.

A peculiarity of perch spawning in the Severn which has persisted for several years is a "leapfrog" selection of spawning levels in the

stream. By this is meant the occurrence of spawning in one area, followed by a blank area, and then another spawning area when all areas would seem equally favorable. Selection of areas may vary in succeeding years.

The strings of eggs were gathered (dipnetted into temporary containers) by experienced spawntakers who waded in places where wading was practicable or otherwise rowed a skiff. Approximately 400,000 eggs (4 quarts) were incubated in each box, these being stirred daily. Total collection of eggs in 1946 amounted to 154,800,000, which



INCUBATION BOX FOR PERCH EGGS, SEVERN RUN

with a hatching efficiency of 80% resulted in a total of 123,840,000 fry produced. Figures for 1947 include 168,800,000 eggs collected, 90% hatching efficiency, 151,920,000 fry produced. Plantings were made in numerous streams and ponds of the Western and Eastern Shores—the fry being transported rapidly, by truck, in good condition and with low observable mortality, in 10-gallon milk can containers prepared for the purpose.

Natural fertility of perch eggs deposited in favorable spawning areas in the Severn is estimated to approach or perhaps exceed 95%. Causes of mortality during hatching procedure may be ascribed chiefly to (1) more or less infection by the everpresent aquatic fungus, *Saprolegnia* sp., and (2) silting and stagnation of the egg masses in the hatchery boxes due to inadequate circulation of water. The first of these is quite difficult to control due to the ubiquitous occurrence of *Saprolegnia* in nature and the impossibility of removing each infected egg, under the hatching system in practice. Mortality from the second cause was kept to a minimum by daily stirrings of the contents of each box to allow deposited silt to pass off and to bring eggs from the center of the mass to more favorable positions. After hatching occurred, it became imperative to remove and ship the fry as rapidly as possible to prevent widespread mortality in the boxes due to fungus infection, favored by crowded conditions, and to the putrefaction of the old egg hulls.

Detailed listings of perch fry plantings in the various localities are given in Tables II and III.

TABLE I

APPROXIMATE COMPARATIVE DATA ON YELLOW PERCH HATCHING AT SEVERN RUN—1946 AND 1947

	1946	1947
Number of eggs collected.....		
Fry Hatched	154,800,000	168,800,000
Efficiency	123,840,000	151,920,000
First appearance of adult fish	80%	90%
Date of first spawning .....	.....	March 12
Spawning period	March 5	March 16
Peak of spawning period.....	March 5-20	March 16-26
Incubation period, average duration	March 9-13	March 21-23
Date of first hatch	20 days	21 days
End of hatching	March 25	April 7
Last appearance of adult fish on spawning grounds	April 2	April 15
Water temperature range for 8 days previous to spawning.....	.....	April 3
Water temperature average for 8 days previous to spawning .....	.....	33°-40°F.
Water temperature at first spawning .....	.....	37°F.
Water temperature range during spawning period	46°F.	42°F.
Water temperature average during spawning period	39°-50°F.	38°-50°F.
Water temperature range during spawning period	45.7°F.	42.7°F.
Water temperature average during incubation period	39°-54°F.	36°-58°F.
Water temperature range during incubation period	48°F.	46.5°F.

TABLE II
YELLOW PERCH FRY PLANTINGS IN MARYLAND
WESTERN SHORE, 1946 AND 1947

	1946	1947
ANNE ARUNDEL COUNTY:		
Severn Run	90,080,000	67,920,000
Furnace Branch Creek	320,000	800,000
Morley Creek .....	.....	800,000
Stoney Creek .....	.....	800,000
Rock Creek	320,000	800,000
Magothy River	320,000	800,000
South River	320,000	800,000
West River	320,000	800,000
Patuxent River (Priest Bridge)	320,000	800,000
Fairview Lake	480,000	800,000
BALTIMORE COUNTY:		
Herring Run .....	.....	800,000
Stemmers Run .....	.....	800,000
Middle River	640,000	800,000
Bird River .....	.....	1,200,000
Gunpowder Falls	320,000	1,200,000
CALVERT COUNTY:		
Lyons Creek	320,000	800,000
Hall Creek	320,000	800,000
Hunting Creek	320,000	800,000
Battle Creek .....	.....	800,000
St. Leonard's Creek	320,000	800,000
CHARLES COUNTY:		
Mattawoman Creek	320,000	1,600,000
Nanjemoy Creek .....	.....	800,000
Ward's Run	640,000	800,000
Mill Run .....	.....	800,000
Port Tobacco	320,000	800,000
Zekiah Swamp	480,000	800,000
Gilbert Swamp	320,000	800,000
HARFORD COUNTY:		
Conowingo Pool	2,080,000	3,000,000
Little Gunpowder Falls	960,000	1,200,000
Bush River	640,000	1,200,000
Bynum Run .....	.....	1,200,000
Swan Creek .....	.....	1,200,000
Church Creek	320,000	1,200,000
Winters Run .....	.....	800,000
.....	.....	1,200,000
PRINCE GEORGE'S COUNTY:		
Patuxent River (Priest Bridge)	320,000	800,000
Patuxent River (Western Branch)	320,000	800,000
Piscataway Creek	320,000	800,000
Honson Creek .....	.....	800,000
Oxon Run .....	.....	800,000
Swanson's Creek	320,000	800,000

ST. MARY'S COUNTY:	1946	1947
Budd's Creek	320,000	800,000
Chaptico Creek		800,000
St. Clement's Creek	320,000	800,000
McIntosh Run	320,000	800,000
St. Mary's River	320,000	800,000
Wicomico Creek		800,000
GARRETT COUNTY:		
Deep Creek Lake	1,920,000	
HOWARD COUNTY:		
Brighton Lake	1,920,000	
U. S. FISH AND WILDLIFE SERVICE:		
Fort Belvoir	2,400,000	
DEPARTMENT OF GAME & INLAND FISH		4,800,000
TOTAL	109,600,000	112,920,000

TABLE III

YELLOW PERCH FRY PLANTINGS IN MARYLAND
EASTERN SHORE, 1946 AND 1947

CAROLINE COUNTY:	1946	1947
Marshyhope Creek	320,000	800,000
Choptank River		800,000
Hunting Creek	320,000	400,000
Tuckahoe River	160,000	800,000
Chapel Branch		800,000
Watts Creek	320,000	800,000
Mill Creek		800,000
CECIL COUNTY:		
Conowingo Pool	2,080,000	3,000,000
North East Creek	640,000	800,000
Elk River	640,000	800,000
Sassafrass River	320,000	800,000
Bohemia River	320,000	800,000
DORCHESTER COUNTY:		
Hunting Creek	320,000	400,000
Chaptank River		800,000
Blackwater River	320,000	800,000
Transquaking River	320,000	800,000
Chicacomico River		800,000
Nanticoke River	320,000	800,000
Marshyhope Creek	320,000	800,000

KENT COUNTY:		1946	1947
Chester River			800,000
Sassafras River			800,000
Morgan Creek	320,000		800,000
Langford Bay			800,000
Gray's Inn Creek	320,000		800,000
Fairlee Creek	320,000		800,000
QUEEN ANNE COUNTY:			
Corsica River	320,000		800,000
Southeast Creek	320,000		800,000
Chester River			800,000
Tuckahoe River	160,000		800,000
Norwich Creek			800,000
Wye Mills	160,000		400,000
SOMERSET COUNTY:			
King's Creek			800,000
Pocomoke River	640,000		800,000
Wicomico River	160,000		800,000
Wicomico Creek	640,000		
Manokin River	320,000		
TALBOT COUNTY:			
Wye Mills	160,000		400,000
Skipton Creek	320,000		800,000
Miles River			800,000
Tred Avon River			800,000
Choptank River			800,000
Moore's Creek	320,000		
WICOMICO COUNTY:			
Wicomico Creek	160,000		800,000
Wicomico River			800,000
Nanticoke River	320,000		800,000
Rewastico Creek	320,000		800,000
Tonytank Creek			800,000
Barren Creek	320,000		800,000
Quantico Creek	320,000		800,000
WORCESTER COUNTY:			
Pocomoke River	320,000		800,000
Dividing Creek	640,000		
Trappe Creek	320,000		800,000
Wagram Creek	320,000		800,000
TOTAL	14,240,000		39,000,000

SHAD

The shad hatchery efforts in 1946 and 1947 were considerably limited, in the main directed at a biological test of the suitability of the North East River as a source of water for the hatching of shad, and the suitability of the general area near Charlestown and Havre de Grace as a source of "salvage" shad spawn, in the event that it should become feasible to install and operate a permanent jar-system shad hatchery at the Head of the Bay.

In conformance with previously established policy, the eggs hatched at Charlestown were salvage eggs—those stripped from ripe or "soft" shad caught in the nets of commercial fishermen. This spawn otherwise would have gone to waste, being neither salable as roe nor available for natural reproduction. An additional advantage of this policy accrues to the fishermen from whom the eggs are bought since soft shad bring a lower price in the market; hence, purchase of the eggs by the State for hatching purposes in effect raises the price of the shad. The eggs were stripped by spawntakers from live fish immediately after capture and were placed in the incubation boxes within a short space of time.

Considerable difficulty was experienced in 1946 in getting eggs because a preponderance of the shad caught commercially on the Susquehanna Flats and in the river were green or unripe ("hard") throughout the entire season. Consequently, the spawn obtained was not of first quality, a factor that probably accounted in large part for the reduction in hatchery efficiency. A tentative explanation ascribes the unripe condition of the shad caught on the Susquehanna Flats to an unexpected shift of the ripe fish from the normal Susquehanna River spawning grounds toward the North East River.

Difficulty was experienced again in 1947, in getting eggs, until the latter part of May, because of scarcity of ripe shad in the catch. The delay in ripening and spawning of the roe shad (a similar situation held in the Potomac River) is attributable to colder seasonal temperatures. General rainfall in the watershed and more particularly harbor-dredging activities at North East kept the North East River muddy, whereas the year before it was clear. This condition led to continuous silting of the eggs in the boxes and favored the attachment and growth of water mold. The total collection at Charlestown in 1946 amounted to 392,000 eggs from which 310,500 fry were hatched, the hatching

efficiency being 76.6%. In 1947, 1,750,000 eggs collected produced 1,312,500 fry, with 75% hatchery efficiency. These efficiency figures compare favorably with the efficiency figures of previous years in other localities, and in view of the inferior quality of the spawn in 1946 and the silting conditions during 1947, they indicate that the waters of the North East River, at the point tested, were of excellent quality for the hatching of shad.

Two men each year were assigned to the U. S. Fish and Wildlife Service shad hatchery at Fort Belvoir on the Potomac, in furtherance of a cooperative arrangement whereby labor is exchanged for shad fry raised by the more efficient jar-system in operation there. Fry obtained from this source numbered 3,487,000 in 1946 and 3,251,000 in 1947, all of which were planted in the Patuxent River. Fry raised at Charlestown were released in the North East River. For listing of shad fry production figures, see Tables IV and V.

TABLE IV
COMMERCIAL FISH HATCHERY SHAD FRY PRODUCTION
IN MARYLAND, 1946 AND 1947

Hatchery Location	YEAR	Eggs Collected	Fry Hatched	Efficiency
North East River.....	1946	392,000	310,500	76.6%
(Charlestown)	1947	1,750,000	1,312,500	75 %
Potomac River	1946	.....	3,487,600	.....
(U. S. Belvoir Hatchery).....	1947	.....	3,251,000	.....
TOTAL	1946		3,798,100	
	1947		4,563,500	

TABLE V
SHAD FRY PLANTINGS IN MARYLAND, 1946 AND 1947

LOCALITY	NUMBER OF FRY PLANTED	
	1946	1947
North East River.....	305,500	1,307,500
Fairlee Pond	5,000	5,000
Patuxent River	3,487,600	3,251,000
TOTAL	3,798,100	4,563,500

DISCUSSION

The beliefs of this Department concerning Maryland's commercial fish hatchery program have not changed materially since they were ably expressed by Hammer ('46) in the published report for the 1944-45 season. Readers are referred to it for a full statement of policy and recommendations. In brief, the value of commercial hatchery effort in Maryland is open to serious question. Millions of shad fry produced and planted in the past have failed to demonstrate their value as a rehabilitating factor in the industry. There has been no evidence that intense perch fry plantings have been rewarded by corresponding increased yields. Several investigators in other areas attempting to correlate fry plantings with production of commercial fish have concluded that there is no measurable causal relationship between fry plantings and subsequent catches (Hile, 1936; Van Oosten, 1942; Miller, 1946). For example, Miller, studying the effectiveness of whitefish fry plantings in Canadian lakes, says his evidence "suggests rather strongly that the whitefish hatchery in Alberta is having no effect on the commercial catch. . . . Preliminary observations on the efficiency of natural reproduction indicate that about 10% of the eggs survive to become fry. This is sufficient to produce roughly 100 times the number of adult fish which a lake can support." It is possible, in some cases, by fry plantings to introduce a species into an area where it was previously unknown, or to reintroduce it into an area where the population has disappeared for some reason. But where there is normally an existing adult population of moderate size, the fry produced naturally should be many times the number possible to raise artificially.

Although shad hatchery operations in the State have largely been on a salvage basis—hatching fully viable eggs which would not be available for natural spawning—and thus have been actually adding to the naturally produced source of fry, it is evident that this artificial addition to the natural spawning effort produces no observable results in terms of increased yields of adult fish. The problem of definitely determining the percentage of survival of planted fry under Chesapeake Bay fishery conditions where there is natural brood stock is a difficult one, not yet solved. Maryland's plans for the future should include experimental research in the production of fingerlings and in the "tagging" of fry and fingerlings which, if successful, would

establish much more reliable evidence upon which to base an evaluation and point the way to sounder policies and practices.

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